CLAIMS

1. An optical device comprising at least a light receiving element and a hologram element, the hologram element diffracting a plurality of incident beams having different wavelengths, the light receiving element having light receiving regions to receive the diffracted beams,

the light receiving element having light receiving regions to separately receive reflected main beams to be used to detect information from an information recording medium and reflected sub-beams to be used for a tracking operation, the reflected main beams of different wavelengths being commonly received by those of the light receiving regions that are configured to receive the reflected main beams, the reflected sub-beams of different wavelengths being separately received depending on the wavelengths by those of the light receiving regions that are configured to receive the reflected sub-beams.

2. An optical device comprising at least a light receiving element and a hologram element, the hologram element diffracting a plurality of incident beams having different wavelengths, the light receiving element having light receiving regions to receive the diffracted beams,

the light receiving element having light receiving regions to separately receive reflected main beams to be used to detect information from an information recording medium and reflected sub-beams to be used for a tracking operation, the reflected main beams of different wavelengths being separately received depending on the wavelengths by those of the light receiving regions that are configured to receive the reflected main beams, detection outputs from the light receiving regions for the main beams being combined into a common output, the reflected sub-beams of different wavelengths being separately received depending on the wavelengths by adjacent ones of the light receiving regions that are configured to receive the reflected sub-beams, detection outputs from the adjacent light receiving regions for the reflected sub-beams being separated from one another.

3. An optical device comprising at least a light receiving element and a hologram element, the hologram element diffracting a plurality of incident beams having different wavelengths, the light receiving element having light receiving regions to receive

the diffracted beams,

the hologram element being divided into first and second regions each diffracting incident beams having first and second wavelengths that are different from each other,

the light receiving element comprising:

a first light receiving region configured to receive reflected main beams of the first and second wavelengths passed through the first region of the hologram element, the reflected main beams being used to detect information from an information recording medium;

a second light receiving region configured to receive the reflected main beams of the first and second wavelengths passed through the second region of the hologram element;

a third light receiving region configured to receive a reflected first sub-beam of the first wavelength passed through the first region of the hologram element, the received sub-beam being used for a tracking operation;

a fourth light receiving region configured to receive a reflected second sub-beam of the first wavelength passed through the first region of the hologram element, the received sub-beam being used for a tracking operation;

a fifth light receiving region configured to receive a reflected first sub-beam of the second wavelength passed through the first region of the hologram element, the received sub-beam being used for a tracking operation;

a sixth light receiving region configured to receive a reflected second sub-beam of the second wavelength passed through the first region of the hologram element, the received sub-beam being used for a tracking operation;

a seventh light receiving region configured to receive the reflected first sub-beam of the first wavelength passed through the second region of the hologram element, the received sub-beam being used for a tracking operation;

an eighth light receiving region configured to receive the reflected second sub-beam of the first wavelength passed through the second region of the hologram element, the received sub-beam being used for a tracking operation;

a ninth light receiving region configured to receive the reflected first sub-beam of the second wavelength passed through the second region of the hologram element, the received sub-beam being used for a tracking operation; and

a tenth light receiving region configured to receive the reflected second sub-beam of the second wavelength passed through the second region of the hologram element, the received sub-beam being used for a tracking operation;

detection outputs from the third and fourth light receiving regions being combined into a common output,

detection outputs from the seventh and eighth light receiving regions being combined into a common output,

detection outputs from the fifth and ninth light receiving regions being combined into a common output,

detection outputs from the sixth and tenth light receiving regions being combined into a common output.

4. The optical device as set forth in claim 3, wherein

the hologram element is substantially halved into the first and second regions along a dividing line that is parallel to a tangent of a recording track of the information recording medium when optically mapped onto the information recording medium so as to halve a reflected beam from the information recording medium in a diameter direction of the information recording medium along the dividing line.

5. The optical device as set forth in claim 4, wherein

a tracking error signal is detected with the use of a differential push-pull method employing the reflected sub-beams of the first wavelength based on a difference between the detection output of the third and fourth light receiving regions and the detection output of the seventh and eighth light receiving regions; and

a tracking error signal is detected with the use of a three-beam method employing the reflected sub-beams of the second wavelength based on a difference between the detection output of the fifth and ninth light receiving regions and the detection output of the sixth and tenth light receiving regions.

6. The optical device as set forth in claim 3, wherein

the first wavelength is of a 650-nm band, the second wavelength is of a 780-nm band, and the optical device detects information from two types of information recording

media conforming to the first and second wavelengths.

7. The optical device as set forth in claim 3, wherein

one of a light source for emitting light of the first wavelength and a light source for emitting light of the second wavelength is integrally formed on a substrate of the light receiving element.

8. An optical pickup apparatus comprising:

the optical device as set forth in any one of claims 1 to 6; and

a laser source configured to emit light of the first and second wavelengths,

the optical device providing an information signal based on main beams and a tracking signal based on sub-beams, the main beams and sub-beams being reflection of the light of any one of the first and second wavelengths from an information recording medium.

9. An optical pickup apparatus comprising:

the optical device as set forth in claim 7;

a laser source configured to emit light of the first wavelength; and

a diffraction grating configured to divide the light of the first wavelength emitted from the laser source into three beams,

the light source formed in the optical device being a laser source configured to emit light of the second wavelength, the optical device having a diffraction grating configured to divide the light of the second wavelength emitted from the laser source into three beams.

10. An optical pickup apparatus comprising:

the optical device as set forth in claim 7;

a laser source configured to emit light of the second wavelength; and

a diffraction grating configured to divide the light of the second wavelength emitted from the laser source into three beams,

the light source formed in the optical device being a laser source configured to emit light of the first wavelength, the optical device having a diffraction grating configured

to divide the light of the first wavelength emitted from the laser source into three beams.